DIGITAL CLIMATIC ATLAS OF REPUBLIC OF MOLDOVA

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Резюме: Представлен Цифровой Климатический Атлас Республики Молдова, содержащий 34 карты средних значений четырех основных климатических индексов – солнечная радиация, температура воздуха, атмосферные осадки и скорость ветра, которые определяют термический и влажностный режим на территории республики. Исходным материалом послужил данные за 1980 – 2009 гг.

Key words: solar radiation, air temperature, precipitation, wind speed.

Rezumat: Este prezentat Atlasul Climatic Digital al Republicii Moldova, care conţine 34 hărţi ale valorilor medii a patru indici climatici de bază – radiaţia solară, temperatura aerului, precipitaţiile atmosferice şi viteza vântului, care determină regimul termic şi de umezeală pe teritoriul republicii. Ca material iniţial au servit datele din anii 1980 – 2009.

Cuvinte cheie: radiaţia solară, temperatura aerului, precipitaţiile atmosferice, viteza vântului

1. Introduction

Principal natural resources of Republic of Moldova are soil and climate. Particularities of the latter determine quantity of light, heat and humidity, which are used by plants on certain geographical regions. As agriculture is basic branch of country's economy, the knowledge of spatial distribution for solar radiation, air temperature and atmospheric precipitations is necessary for more adequate placement of agricultural plants depending on their requirements.

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Principal source of energy is solar radiation, which is mainly transformed in heat and wind.

We should also mention the fact that these resources are used not only in agriculture, but also for electric and thermic energy production.

Taking into account the fact that Republic of Moldova is poor in local energetic resources and they are represented mainly as unconventional ones, the spatial distribution's estimation for energetic resources is of major importance for the country.

As climatic data is recorded at meteorological stations, which are not so numerous in republic, the data should be interpolated (modeled) spatially using geoinformational technologies and taking into account geographical position and relief forms, because relief essentially influences climatic indexes values.

2. Materials and methods

Digital maps series of climatic indexes [1-4 etc] registered on meteorological stations of State Hydrometeorological Service in the period of 1961-1990 (basic 30-year period proposed by World Meteorological Organization) were elaborated during many years in Climatology Laboratory within institutional programs framework. Simultaneously spatial interpolation methods of climatic indexes were elaborated.

While all effects of global warming were observed since 70s of XX century, they had been more evidently manifested since 1980s.

Taking into account all related above, a necessity appeared to elaborate a more complex product with recently registered climatic data. Thus we have completed climatic indexes database for 1980-2009 period (30 years), which together with previously elaborated spatial interpolation methods have been the basis for Digital Climatic Atlas of Republic of Moldova elaboration.

We used regression equations method [3, 5] as spatial interpolation method for average temperatures and precipitation sums based on meteorological stations characteristics and digital maps of absolute altitude, aspect and slope of relief. Solar radiation was calculated using Solar Analyst module [6], implemented recently in ArcView and ArcGIS.

3. Atlas structure

Digital maps elaboration for atlas was executed in ArcView and ArcGIS GIS.

Digital Climatic Atlas of Republic of Moldova contains the following compartments of principal climatic indexes:

1. Total, direct and diffuse solar radiation (isolation) and direct sunshine duration in annual aspect and in warm period - 8 maps;
2. Mean temperatures in annual, seasonal and monthly aspect – 17 maps;
3. Mean atmospheric precipitation sum for annual, seasonal and warm and cold periods aspects – 7 maps;
4. Mean annual wind speed - 2 maps.

Atlas contains explicative notes and 34 maps. Maps contain legends, tables, graphs and photos.

Atlas will be prepared for edition in A4 format at 1:1500000 scale.

Several maps from atlas are presented below.

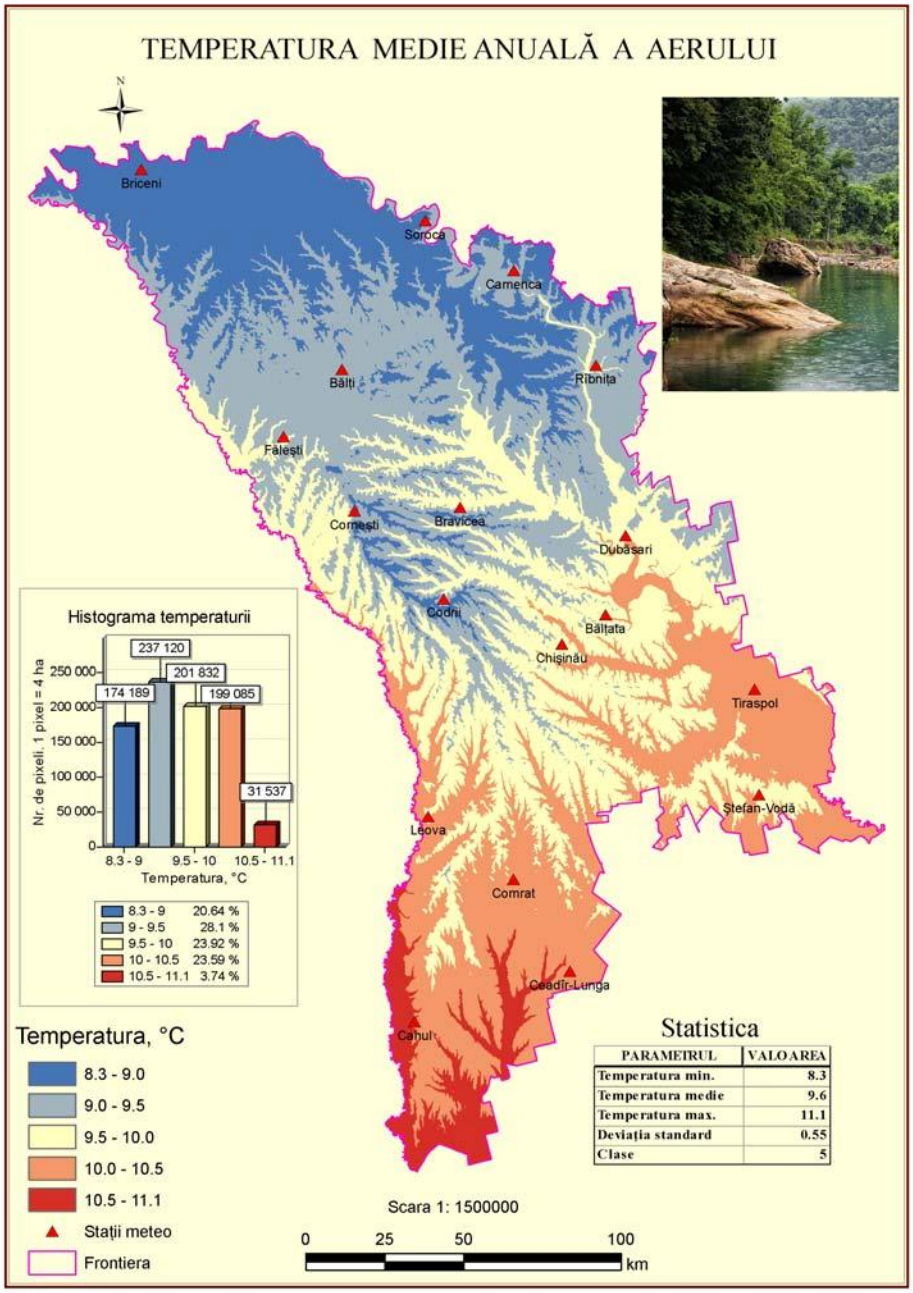

Fig. 1. **Mean annual air temperature**

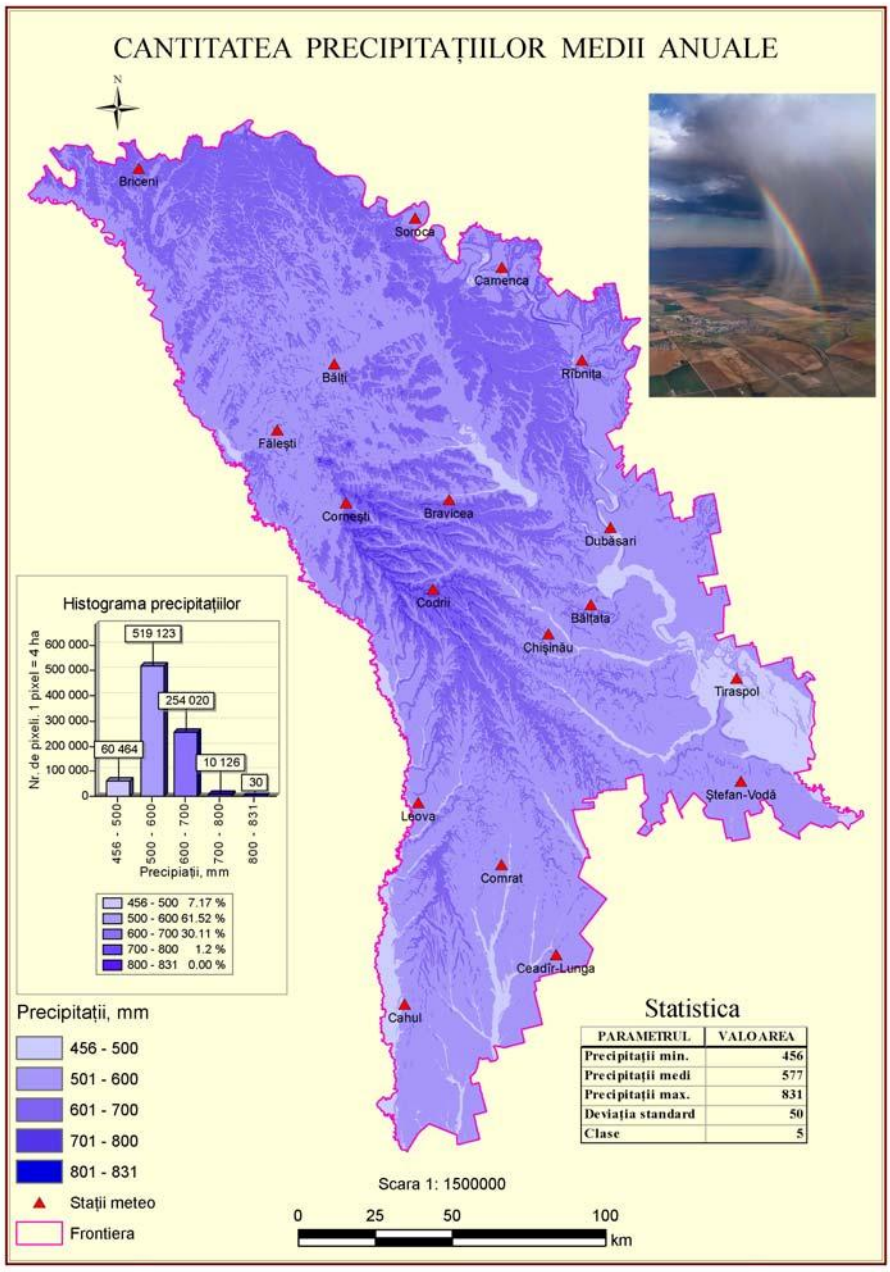

Fig.2. **Sum of mean annual precipitation**

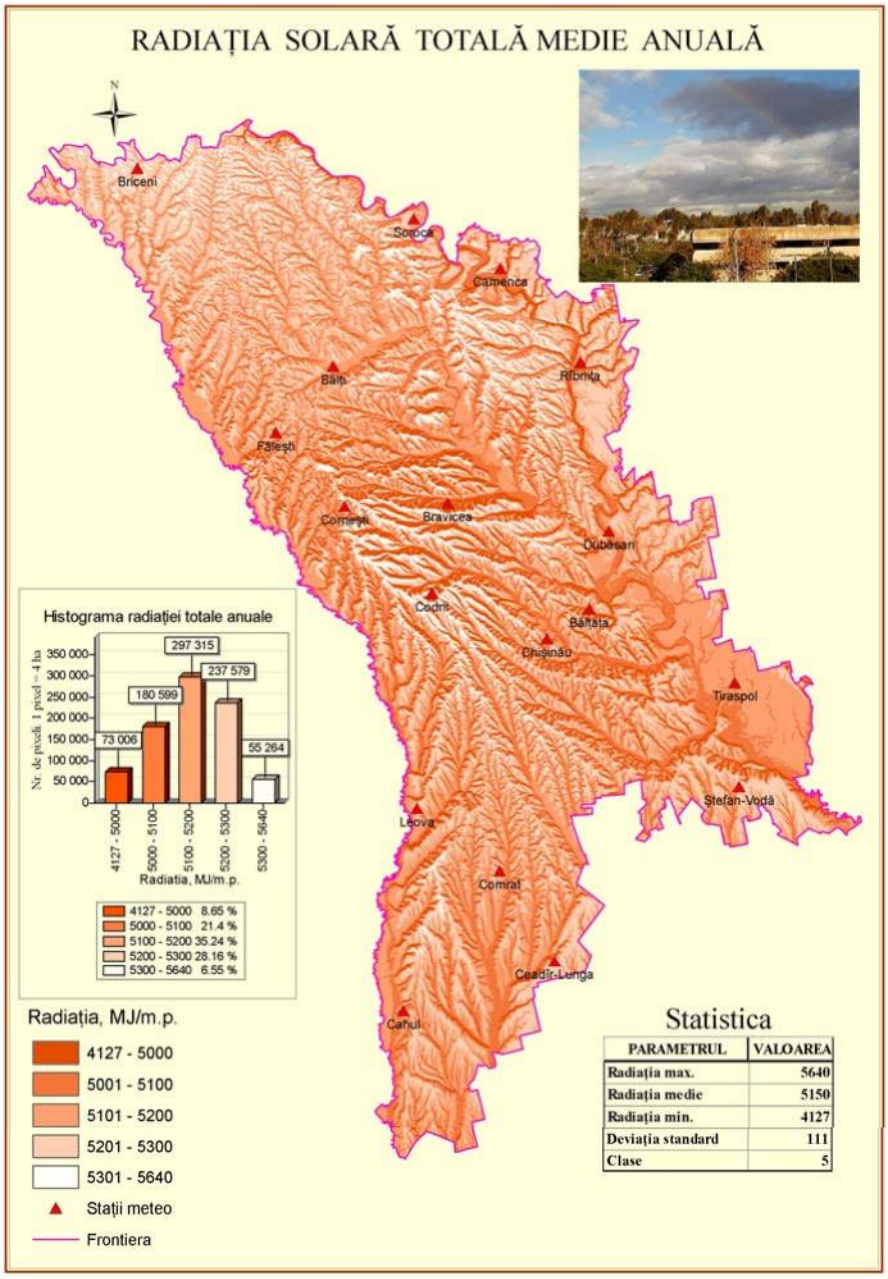

Fig.3. **Mean annual total solar radiation**

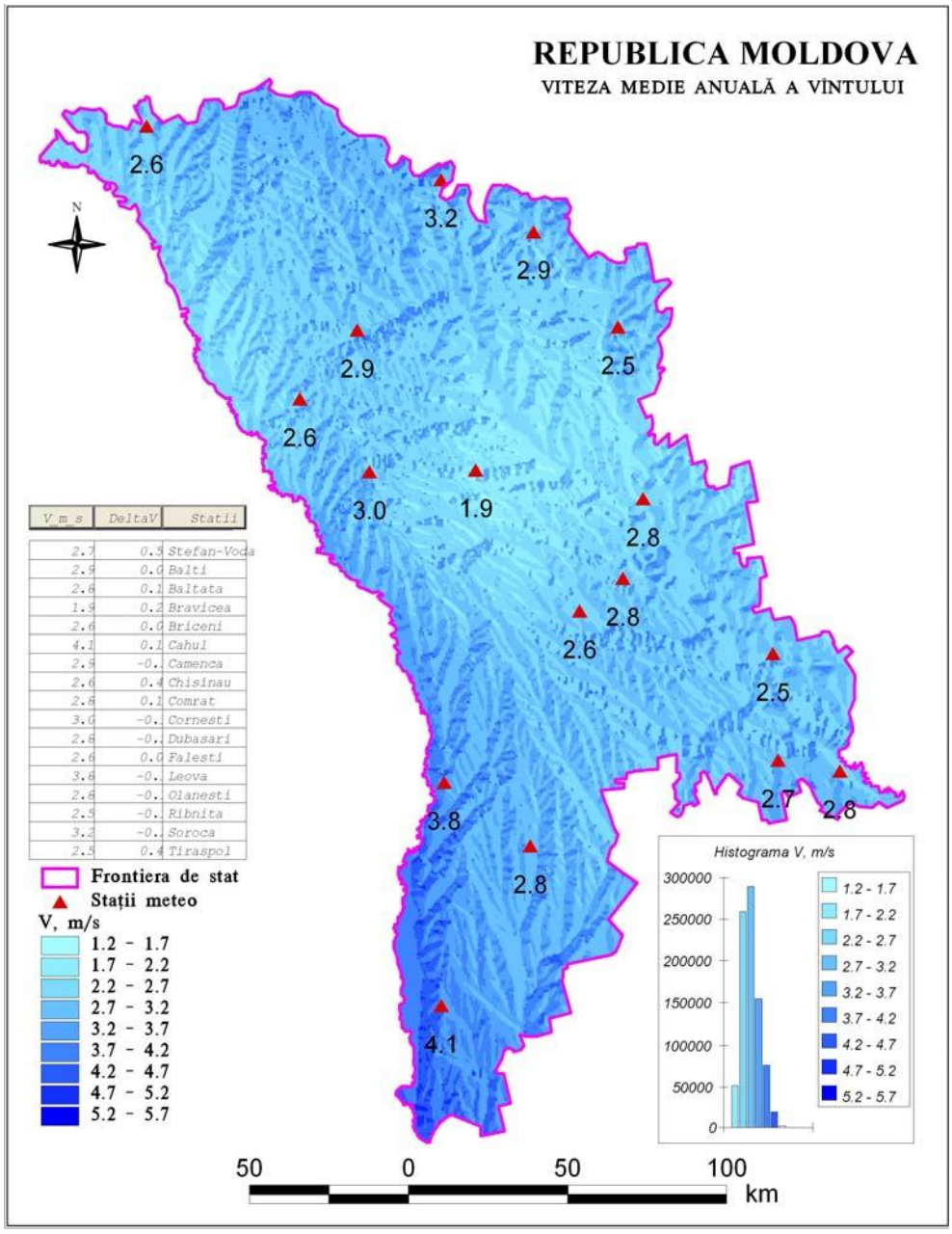

Fig.4. **Mean annual wind speed**

Bibliography

1. Constantinov T., Răileanu V., Nedealcov M. *Particularităţile distribuţiei spaţiale a radiaţiei solare pe teritoriul Republicii Moldova – sursă de energie renovabilă reală*. Energetica Moldovei. Chişinău: Tipig. AŞM, 2005. p.642-645.
2. Constantinov T, Răileanu V., Nedealcov M, Crivova O. *Evaluation du regime thermique du territoire de la République de Moldavie en utilisant le SIG*. Lucrările Simpozionului „Sisteme Informaţionale Geografice", nr. 13. Analele Ştiinţifice ale Universităţii „Al. I. Cuza" Iaşi , Tom LIII, s. II c., Geografie, 2007. Editura Universităţii „Al. I. Cuza" Iaşi, 2007. p. 11-21
3 Constantinov T, Răileanu V., Crivova O. *The identification of precipitation distribution's regional particularities using informational technologies*. Bul Inst. Politec, Iaşi. Univ. Teh. „Gh. Asachi", Iaşi, Tom LV, Fasc. 3, s Hidrotehnica, 2009. p. 37-43
4. Patriche C. V. *Metode statistice aplicate în climatologie*. Iaşi, Terra Nostra.. 2009. 170 p
5. *Solar Analyst 1.0.* User Manual. Solar Environmental Modeling Institute. 2000. 51 p.
6. Constantinov T, Raileanu V, Nedealcov M, Crivova O. *Spatial modelling of solar radiation components using Geographic Information Systems*. Lucrările Simpozionului „Sisteme Informaţionale Geografice". Analele Ştiinţifice ale Universităţii „Al. I. Cuza" Iaşi. În tipar